becomes so rapid that photographs exposed one-fiftieth of a second show blurring, due to movement. On changing the red light to violet or mild white, streaming instantly stops and sometimes reverses. Swinging in green, red or yellow screens causes the flow to be resumed after an interval varying in different individuals from an almost imperceptible minimum to ten seconds. The following effect of any color was generally constant after the same preceding color, and as stimulants to flow the colors increased in effectiveness as one approached the red end of the spectrum, while as retarders of flow white light and the colors at the actinic end were most powerful.

The preceding experiments were performed by means of a large photomicrographic apparatus, the image of the *Amœba* being projected by an arc light upon the ground glass back. What little heat there was [24.8° C.] was equalized for the different colors by mica screens. Intensity was eliminated by adding more color screens, which diminished the brightness but seemed to accentuate the characteristic color effect, whether it was a retarding or a stimulating effect.

Stolonization in Autolytus varians. P. C. MENSCH.

As many as eight individual stolons have been observed in single chains of this species. The embryonic segments forming the stolons are derived as outgrowths from the last segment of the *parent stock*, which itself shows internal structures different from those of preceding segments. This process of segment formation contributes three or four segments to the future stolon, the posterior one of the series retaining its embryonic characters and forming the anal segment of the stolon. At the time the anterior of the three or four embryonic segments begin to thicken for the formation of the head a new segment appears anterior to the anal segment, and the future elongation of the stolon takes place by the separation of new segments from the anal segment.

The separation of the stolon takes place in a region of embryonic tissue which does not form part of a true segment, but which is derived from the undifferentiated tissues of the anal segment.

A wide range in the position of the chain exists in this species. In young specimens the chain is as far forward as the 19th segment of the parent stock, while in older and larger specimens it is placed as far posterior as the 59th segment, certain characters in the embryonic region of the chain indicating that, besides being active in the formation of stolons, this region also adds segments to the parent stock.

The cycle of stolonization in this species is: (1) The development of a first stolon on the young asexual individual by a process akin to fission. (2) The development of a chain of stolons from the last segment of the parent stock by budding. (3) The development of possibly a single stolon posterior to the middle region of the parent stock by true fission.

The Use of the Centrifuge for Collecting Plankton. G. W. FIELD.

HENSEN'S counting method is the present basis of quantitative and qualitative Plankton determinations. Yet improvements are desirable and feasible. The desideratum is a practical, rapid, simple method capable of general application, by which data can be obtained for use in determining the comparative economic value of all waters, either for scientific agriculture or for municipal water supplies. Counting of individuals and enumeration of species seem to be necessary, together with an accurate estimation of the volume of the inorganic matter and of the organic amorphous débris.

The chemical determination of the amount

of aluminoid ammonia is practically worthless on account of the organic débris.

The main difficulty in the various methods seems to rest in the manner of collecting the Plankton. The Hensen net and its method of use are open to objections, and filtration methods vary widely in their accuracy and results. Experiments carried on at the marine laboratory of the Rhode Island Agricultural Experiment Station seem to show that the collection and determination of Plankton by a centrifuge is a very rapid and accurate method, and that the results read volumetrically on the graduated glass collector are of value when taken in connection with the nature of the material collected. The total percentage of Planktonts obtained and their condition, especially of the most delicate forms, far surpasses any other method known to me. The work has been carried on with the Plantonokrit, designed and described by Dr. C. S. Dolley (Proc. Acad. Nat. Sci., Phila., May, 1896). The machine acts upon a fixed quantity of water (2 cans, each of 1 litre capacity). Nearly two years' work with the method have given results sufficient to warrant continued experiments.

Note on Ascidian Anatomy. M. M. Metcalf.

Neural gland.—A neural gland is present in all groups of Tunicates, including *Appendiculariæ*, *Salpidæ*, *Octacnemus*.

Its position.—In *Appendiculariæ*, dorsal; in *Simple Ascidians*, dorso-lateral (*Molgulidæ*), dorsal (*Cynthiidæ*) or ventral; in *Compound Ascidians*, dorsal (*Botryllidæ*) or ventral; ventral in *Doliolidæ*, *Pyrosomidæ*, *Salpidæ* and *Octacnemus*.

Its size.—Insignificant in *Appendicularia;* in *Ascidians* varies from a minute and nearly functionless gland to a size fifteen times as large as the ganglion; in *Pyrosoma* and *Salpa* small; in *Doliolum* equal to the ganglion.

Many *Simple Ascidians* have the gland prolonged into the dorsal raphe, *i. e.*, into the median portion of the pharyngeo-cloacal septum. In most of these species merely the duct of the gland is so prolonged; in other forms the raphe contains much glandular tissue in connection with the duct.

In some species of *Simple* and *Compound Ascidians* the tissue of the gland is continuous with the cellular area of the ganglion, recalling the way in which they both are formed from a common structure, the visceral region of the larval neural tube. This origin of the gland from the neural tube (as described by Julin) is readily demonstrated in *Molgula Manhattensis* and in *Ecteinascidia turbinata*.

In all species studied the secretion of the gland is formed by the degeneration and disintegration of cells proliferated from the walls of the duct or its branches. It is, therefore, extremely doubtful if the gland has any renal function. No concretions were found.

The condition of the gland is very different in different species. The divergence affects its size, position and shape. Portions present in one species may be absent in another species of the same genus. The homology of the gland in *Salpa* with that of the *Ascidians* is doubtful.

Function of ciliated funnel.—It is not merely the aperture of the duct of the gland, for (1) it is often not connected with the gland, though well developed (*e. g.*, *Salpa*), and (2) it has a rich innervation in several species of *Simple Ascidians* and apparently in some *Salpas*. In some species, at least, it is probably a sense organ.

The intersiphonal organs of Tunicates show a remarkable asymmetry. Assuming the sagittal plane of the ganglion to coincide with that of the whole animal, the funnel is on the right side, and so also is often the whole or a part of the gland.

In *Molgula Manhattensis* there is a great semilunar fold of ectoderm that pushes into the cloaca parallel to the pharyngeo-cloacal